

Amendment and Response

Applicant: Jeffery S. Hess

Serial No.: 10/061,514

Filed: February 1, 2002

Docket No.: 10010488-2

Title: SUBSTRATE AND METHOD OF FORMING SUBSTRATE FOR FLUID EJECTION DEVICE**IN THE CLAIMS**

Please amend claims 72, 81, 82, 86, 91, 92, 97, and 98 as follows:

72. (Currently Amended) A method of forming an opening through a substrate, the method comprising:

etching a first portion of the opening into the substrate from a first side;

etching a plurality of second portions of the opening into the substrate from a second side opposite the first side;

continued etching of at least one of the first portion and the plurality of second portions of the opening to the other of the first portion and the plurality of second portions of the opening; and

overetching each of the second portions of the opening at an interface between the first portion and each of the second portions of the opening, including communicating each of the second portions with an adjacent one of the second portions and diverging at least one of the second portions from the second side toward the first side.

73. (Previously Presented) The method of claim 72, wherein overetching each of the second portions of the opening includes forming a plurality of third portions of the opening, and wherein communicating each of the second portions with an adjacent one of the second portions includes communicating each of the second portions with an adjacent one of the second portions via the third portions.

74. (Previously Presented) The method of claim 72, wherein overetching each of the second portions of the opening includes etching from the interface between the first portion and each of the second portions of the opening toward the second side.

75. (Previously Presented) The method of claim 72, wherein overetching each of the second portions of the opening includes overetching at least one side of each of the second portions of the opening.

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76. (Previously Presented) The method of claim 72, wherein overetching each of the second portions of the opening includes overetching two opposing sides of at least one of the second portions of the opening.
77. (Previously Presented) The method of claim 72, further comprising:
overetching the first portion of the opening at the interface between the first portion and each of the second portions of the opening.
78. (Previously Presented) The method of claim 72, wherein communicating each of the second portions with an adjacent one of the second portions includes communicating at least one side of each of the second portions with at least one side of an adjacent one of the second portions.
79. (Previously Presented) The method of claim 72, wherein communicating each of the second portions with an adjacent one of the second portions includes communicating one side of at least one of the second portions with one side of an adjacent one of the second portions and communicating another side of the at least one of the second portions with one side of another adjacent one of the second portions.
80. (Previously Presented) The method of claim 72, wherein communicating each of the second portions with an adjacent one of the second portions includes communicating at least one of the second portions with two adjacent ones of the second portions.
81. (Currently Amended) The method of claim 72, wherein etching the first portion of the opening includes converging the first portion of the opening from the first side toward the second side, and wherein etching the plurality of second portions of the opening includes converging each of the second portions of the opening from the second side toward the first side, ~~and wherein overetching each of the second portions of the opening includes diverging at least one of the second portions of the opening from the second side toward the first side.~~

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82. (Currently Amended) ~~The method of claim 72~~ A method of forming an opening through a substrate, the method comprising:
etching a first portion of the opening into the substrate from a first side;
etching a plurality of second portions of the opening into the substrate from a second side opposite the first side;
continued etching of at least one of the first portion and the plurality of second portions to the other of the first portion and the plurality of second portions; and
overetching each of the second portions at an interface between the first portion and each of the second portions, wherein overetching each of the second portions of the opening includes including, in a first direction, diverging at least one of the second portions of the opening from the second side toward the first side and, in a second direction, converging each of the second portions of the opening from the second side toward the first side.
83. (Previously Presented) The method of claim 72, wherein etching the first portion of the opening includes anisotropically wet etching into the substrate from the first side.
84. (Previously Presented) The method of claim 72, wherein etching the plurality of second portions of the opening includes anisotropically wet etching into the substrate from the second side.
85. (Previously Presented) The method of claim 72, wherein overetching each of the second portions of the opening includes anisotropically wet etching at the interface between the first portion and each of the second portions of the opening.
86. (Currently Amended) A method of forming a substrate for a fluid ejection device, the method comprising:
etching into the substrate from a first side, including forming a first slot in the substrate;
etching into the substrate from a second side opposite the first side, including forming a plurality of second slots in the substrate;

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continuing etching into the substrate from at least one of the first side and the second side toward the other of the first side and the second side, including communicating the first slot and the plurality of second slots; and

etching into the substrate at an interface between the first slot and each of the second slots, including communicating each of the second slots with an adjacent one of the second slots and diverging at least one of the second slots from the second side toward the first side.

87. (Previously Presented) The method of claim 86, wherein etching into the substrate at the interface between the first slot and each of the second slots includes etching toward the second side of the substrate at an angle to the second side.

88. (Previously Presented) The method of claim 86, wherein etching into the substrate at the interface between the first slot and each of the second slots includes etching along at least one side of each of the second slots.

89. (Previously Presented) The method of claim 86, wherein etching into the substrate at the interface between the first slot and each of the second slots includes etching along two opposing sides of at least one of the second slots.

90. (Previously Presented) The method of claim 86, wherein etching into the substrate at the interface between the first slot and each of the second slots includes etching toward the first side of the substrate at an angle to the first side.

91. (Currently Amended) The method of claim 86, wherein forming the first slot in the substrate includes converging the first slot from the first side toward the second side, and wherein forming the plurality of second slots in the substrate includes converging the second slots from the second side toward the first side, and wherein etching into the substrate at the interface between the first slot and each of the second slots includes diverging at least one of the second slots from the second side toward the first side.

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92. (Currently Amended) ~~The method of claim 86~~ a method of forming a substrate for a fluid ejection device, the method comprising:

etching into the substrate from a first side, including forming a first slot in the substrate;

etching into the substrate from a second side opposite the first side, including forming a plurality of second slots in the substrate;

continuing etching into the substrate from at least one of the first side and the second side toward the other of the first side and the second side, including communicating the first slot and the plurality of second slots; and

etching into the substrate at an interface between the first slot and each of the second slots, wherein etching into the substrate at the interface between the first slot and each of the second slots includes including, in a first direction, diverging at least one of the second slots from the second side toward the first side and, in a second direction, converging each of the second slots from the second side toward the first side.

93. (Previously Presented) The method of claim 86, wherein forming the first slot includes forming a pair of first slots in the substrate, wherein forming the plurality of second slots includes forming a first plurality of second slots and a second plurality of second slots in the substrate, and wherein communicating the first slot and the plurality of second slots includes communicating a first of the pair of first slots and the first plurality of second slots and communicating a second of the pair of first slots and the second plurality of second slots.

94. (Previously Presented) The method of claim 93, wherein communicating each of the second slots with an adjacent one of the second slots includes communicating each of the first plurality of second slots with an adjacent one of the first plurality of second slots and communicating each of the second plurality of second slots with an adjacent one of the second plurality of second slots.

95. (Previously Presented) The method of claim 93, wherein forming the pair of first slots in the substrate includes spacing the first slots on the first side of the substrate, and wherein forming the first plurality of second slots and the second plurality of second slots in

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the substrate includes spacing the first plurality of second slots on the second side of the substrate and aligning the first plurality of second slots with the first of the pair of first slots and includes spacing the second plurality of second slots on the second side of the substrate and aligning the second plurality of second slots with the second of the pair of first slots.

96. (Previously Presented) The method of claim 95, wherein spacing the first plurality of second slots on the second side of the substrate and spacing the second plurality of second slots on the second side of the substrate includes substantially aligning the first plurality of second slots with the second plurality of second slots on the second side of the substrate.

97. (Currently Amended) ~~The method of claim 95~~ A method of forming a substrate for a fluid ejection device, the method comprising:

etching into the substrate from a first side, including forming first slots in the substrate;

etching into the substrate from a second side opposite the first side, including forming a first plurality of second slots and a second plurality of second slots in the substrate;

continuing etching into the substrate from at least one of the first side and the second side toward the other of the first side and the second side, including communicating a first of the first slots and the first plurality of second slots and communicating a second of the first slots and the second plurality of second slots; and

etching into the substrate at interfaces between the first slots and the second slots, including communicating each of the second slots with an adjacent one of the second slots,

wherein forming the first plurality of second slots and the second plurality of second slots includes aligning the first plurality of second slots with the first of the first slots, aligning the second plurality of second slots with the second of the first slots, wherein spacing the first plurality of second slots on the second side of the substrate and spacing the second plurality of second slots on the second side of the substrate includes and staggering the first plurality of second slots with the second plurality of second slots on the second side of the substrate.

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98. (Currently Amended) ~~The method of claim 95~~ A method of forming a substrate for a fluid ejection device, the method comprising:

etching into the substrate from a first side, including forming first slots in the substrate;

etching into the substrate from a second side opposite the first side, including forming a first plurality of second slots and a second plurality of second slots in the substrate;

continuing etching into the substrate from at least one of the first side and the second side toward the other of the first side and the second side, including communicating a first of the first slots and the first plurality of second slots and communicating a second of the first slots and the second plurality of second slots; and

etching into the substrate at interfaces between the first slots and the second slots, including communicating each of the second slots with an adjacent one of the second slots,

wherein forming the first plurality of second slots and the second plurality of second slots includes aligning the first plurality of second slots with the first of the first slots, aligning the second plurality of second slots with the second of the first slots, wherein spacing the first plurality of second slots on the second side of the substrate and spacing the second plurality of second slots on the second side of the substrate includes and overlapping the first plurality of second slots with the second plurality of second slots on the second side of the substrate.

99-112. (Withdrawn)